Decolonisation of education through citizen science: Slow science, not slow violence. The case study Diamonds on the Soles of Their Feet

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Abstract

Citizen science projects are vulnerable to top-down directivity, and driven by assumptions of one-directional ambitions with regard to capacity building and knowledge production. Through the story of Ruth, we discuss how deep-seated legacies of inequality influence the politics of knowledge and explore what we, involved in citizen science projects, could learn from the politics of knowledge as it emerges from decolonisation struggles—particularly as manifested within the academy. Most universities are orientated around Western knowledge regimes that mute many other ways of knowing and ordering the world. Significant inroads have been made when writing on decolonising education but less is known about the effects of the colonisation of state institutions and the disturbances, interferences, and disruptions to organising, sharing, and creating knowledge in public spheres outside of these same universities. These disturbances affect the personal and collective histories of people so that when they are part of research linked to the university, their everyday lives become enmeshed with institutional hegemonies. Research is not dissociated from its deeply entrenched colonial roots. If decolonisation means going deeper into the legitimacy of knowledge and who and how this is being defined, then this must include the process of producing that knowledge outside the bastions of power.

Keywords: decolonisation, higher education, citizen science, slow science, water quality monitoring, transformative potential, shame

Introduction

In an earlier publication titled *Keep the Flow* (Goldin et al., 2023), we addressed the transformative and emancipatory potential of citizen science not only concerning its role in groundwater management, but also regarding its contribution to enhanced and sustainable well-being. We told a hopeful story about research in the Hout catchment in the province of Limpopo in South Africa, where all share a vulnerable dependency on the dwindling availability of water. We proposed that the interaction between human water systems and its contextual social dimensions with regard to diversity and historically shaped structures of power has had serious impacts on the ability to tackle challenges of sustainable water management. We argued that citizen scientists markedly expanded data collection and analysis at a fraction of the cost of traditional scientific endeavours. Our article also foregrounded the potential of citizen science to create agonistic learning spaces that recognise differences and inequalities between all involved when citizen scientists and academic scientists cooperate.

In their article, "Contours of Citizen Science: A Vignette Study," Haklay et al. (2021) drew attention to the proliferation of definitions and typologies of citizen science. The authors discussed challenges in terms of agreeing about a definition of the concept, and concluded that plural understandings are far more realistic given the diverse disciplinary lenses that are applied in citizen science. Wehn et al. also reflected on the many forms, definitions, and meanings of citizen science, and reminded us that while some definitions focus more on citizen science as a tool for collection and analysis of data, "others define it as a multi-stakeholder process that aims at increasing democratization of science and policy, scientific citizenship, public engagement, transparency, equity, inclusiveness and justice" (2021, p. 1). Aware of the flurry of definitions and contested meanings of citizen science, Goldin et al. (2022) defined it quite succinctly as taking science out of libraries and laboratories and into life. The term "citizen science" separates it from academic science but should in no way be perceived to be less than science; rather, it makes novel contributions of how we understand the world (Liebenberg et al., 2021).

As Ballard (2021) reminded us, scientists do not necessarily understand the needs, interests, and knowledge of people and communities. Scientists—and the structures that support them—are rarely educated, and even less inspired, to support community engagement as part of their scientific endeavours. And, to be honest, the reverse is also true: people outside the academy may not have much insight into the inner functioning of universities and the logic of their funders. Collaboration gets even more complicated when one realises that neither citizens nor scientists form two monolithic blocks. Within these two categories, there are numerous positionalities and inequalities. The result is that citizen science projects are often conducted on uneven playing fields that were produced and reproduced within historical and geopolitical circumstances that linger on in the present.

In this article, we want to explore some of the parallels between what happens in citizen science projects and what occurs in practices of decolonisation within universities.

Particularly, but not exclusively, in international North–South university collaboration, we see persistent patterns of exclusion and uneven power hierarchies, which are also manifested when universities cooperate with citizen scientists in local communities. Both practices are confronted with historical legacies, which produce an unevenness that carries on in the present. These historical legacies are grounded in colonial routines, which not only affect North–South university collaboration, but also pose major challenges in projects in which Southern based universities collaborate with local communities in the South. We argue that this unevenness is systemically embedded—not only in universities in the North, but similarly in universities located in the global South.

This should not be surprising given that the modernist university, including universities on the African continent, were moulded as a top-down colonial project with a "civilising" mission. We need to remind ourselves that decoloniality has a history and praxis of more than 500 years. Mignolo and Walsh traced its beginnings in the Americas where

> decoloniality has been a component part of (trans)local struggles, movements, and actions to resist and refuse the legacies and ongoing relations and patterns of power established by external and internal colonialism. (2018, p.16)

> Decoloniality denotes ways of thinking, knowing, being and doing [which imply] the recognition and undoing of the hierarchical structures of race, gender, heteropatriarchy and class that continue to control life, knowledge, spirituality and thought, structures that are clearly intertwined with and constitutive of global capitalism and Western modernity. (2018, p. 17)

Further, Mignolo and Walsh argued that decoloniality seeks to "open up, and advance radically distinct perspectives that displace Western rationality as the only framework and possibility of existence, analysis and growth" (2018, p. 17). We know from the work of Gorski (2008, p. 515 as quoted in Houweling, 2021) that decolonisation is the effort to dismantle "dominant hegemony, hierarchies, and concentrations of power and control" related to geopolitics, race, class, gender, or other identities.

Most universities are orientated around Western knowledge regimes that mute many other ways of knowing and ordering the world. Jansen illustrated this pointedly in a newsletter of the Academy of Science of South Africa after a group of Dutch scholars visited his office to talk about research partnership. Jansen remarked:

> Of course, I liked the idea, having enjoyed such productive collaborations in social and educational research over the years. But then they slipped in the words "capacity building" meaning they wanted to contribute to our ability to do research. In true Dutch style, I told them in no uncertain terms that those colonial assumptions were misplaced; I asked whether they had paid attention at all to the decolonization moment in both our countries. (2023, para. 1)

> Capacity building . . . sounds nice until you turn the focus northwards: can you imagine a research partnership in which the target or beneficiaries of capacity building are young Dutch academics being co-developed by Africans? Of course not. That's because the colonial commonsense of who delivers capacity building and who needs its upliftment are logics deeply embedded within the research development enterprise. (2023, para, 2)

Interesting, in terms of the analogies we want to draw regarding citizen science projects, Jansen then flipped his reflection and noted:

> The truth is we are not innocent in Africa in having our erstwhile colonial masters believe that they control the terms of the development partnership because they usually bring the millions in research funds to the table. African researchers often stand in line when powerful partners from the North come holding money bags because those funds could supplement the meagre salaries of academics in much of the continent. (2023, para, 3)

Finally, and again relevant to the point we want to make in this article, is how Jansen concluded:

> In short, if decolonization means anything at all it has to imply finding a whole new language for research partnerships, one in which a term like capacity building is jettisoned once and for all because it carries too much colonial freight that weighs us down. (2023, para, 7)

Having been involved in citizen science projects over a number of years, we observed that similar dynamics are reflected in projects where universities collaborate with local citizens whose realities are the subject of research. Here too, collaborative participants, despite all good intentions, are often confronted with colonial legacies that highly influence the politics of knowledge within their projects. Citizen science projects too, are vulnerable to top-down directivity and driven by assumptions of one-directional ambitions with regard to capacity building and knowledge production.

Just as intercontinental academic collaboration is often funded by consortiums of universities and funding agencies from the global North, many local citizen science projects too, are funded by (international) partner organisations. Typically, a local university is assigned to hold the money bags Jansen referred to. This should ensure that the funding comes with all the institutional rules that guide them in the distribution of money, and the need to adhere to established systems of accountability. The rules that apply are generally meant to satisfy ethical research guidelines, provide transparency, and counter seductions such as corruption, fraud, and nepotism. These are fair concerns, which deserve fair consideration. However, in citizen science projects, notions of one-directional capacity building and stark uneven financial circumstances can play a distinct role in perpetuating the unequal and inequitable circumstances that frame their research cooperation. Such projects may undermine their own emancipatory objectives.

Fanon (1963)—and in the 80s, Ngũgĩ wa Thiong'o (1986)—clearly illustrated that the decolonisation process is complex and multi-dimensional, and replete with conflicts, contradictions, and paradoxes. Mbembe (2016) focused on decolonisation in higher education in particular, drawing attention to the fact that the decolonisation process encompasses all aspects of being in the higher education space. These aspects include the predominantly colonial architecture of university campuses, the Eurocentric academic model that still exists, and the authoritative systems of control and management.[1] The work of the Zimbabwean decolonial theorist Sabelo Ndlovu-Gatsheni (2022), particularly in his book *Decolonization, Development and Knowledge in Africa*, took up Fanon's (1963, p. 316) call to "turn over a new leaf" by opening up avenues for Africa to attain liberation, decolonisation, and self-determined development. A pertinent question too, might be whether the colonised should aim to be included in colonial structures or dismantle them entirely in pursuit of alternative futures rather than persisting to pay homage to Eurocentric regimes of knowledge—as perhaps culminated in South Africa in the Rhodes Must Fall movement. The modes of assessment and feedback and research protocols need to be overhauled so that they respond directly and are accountable to community needs rather than academic standards, hierarchies, and career ambitions (Mantz, 2021). As van Stam (2017, p. 8) deduced from his work in rural Zambia and Zimbabwe, decolonisation aims for "embodied knowledge" that develops when people interact with each other and with their non-human environments.

To illustrate ways in which a citizen science project becomes entangled in decolonisation processes, we turn to our own citizen science project, Diamonds on the Soles of Their Feet, in Limpopo province, South Africa—one of the country's poorest provinces. Approximately 80 per cent of the population lives in rural areas (Matakanye & Tshitangano, 2024) where the distances are vast and the roads are bad and often difficult to navigate.

Limpopo faces multiple challenges of poverty, unemployment, inequality, and concomitant poor health conditions. The official unemployment rate among youth (15–34 years) was 46.3% in the first quarter of 2021 (BusinessTech, 2021). It is estimated that up to one-third of the people in Limpopo suffer from serious medical conditions such as hypertension and other non-communicable diseases including diabetes, mental illness, heart disease, arthritis, tuberculosis, stroke, and cancer (Mbhatsani et al., 2021).

Introducing our citizen science project Diamonds on the Soles of Their Feet (DSF)

The DSF project is funded by a science shop[2] grant,[3] which is implemented by the University of the Western Cape (UWC) in South Africa in collaboration with local citizen scientists and

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1   This paragraph is inspired from the work of Padayachee et al. (2018).
2   The work of a science shop can be described as community-based research.
3   From the South African Department of Science and Innovation administered by the South African Agency for Science and Technology Advancement, which is a business unit of the National Research Foundation (https://www.nrf.ac.za/call-for-proposals-inclusive-community-based-research-science-shops-development/)

other national and international partners.[4] The money strings are tightly held by UWC. What this means for collaborative work with citizen scientists will be exemplified further on in this article, with the story of one of our citizen scientists, Ruth (a pseudonym). However, before we go deeper into Ruth's story, we need to provide some context about the community involvement in the project.

Although the project initially focussed on measuring groundwater levels, local residents foregrounded that not only water levels, but also water quality was of deep concern to their communities in the area. They also expressed the need to involve young learners in local schools so that we could make an impact on future generations. And so, DSF progressed to a new phase, which was driven by the community's quest to know more about water quality and to co-design a youth programme that would link young learners to their local environment. The new phase would be about local citizen scientists who would be trained to monitor surface water quality in rivers and streams near selected schools in the Hout Catchment. Seven schools were selected. Thirty learners and two teachers from each school were given an orientation lesson by citizen scientists as the first step in training for an intensive activity known as the "blitz." During this blitz, the DSF team involved the learners in taking samples of water from the rivers and analysing them so that they could assess the status of the health of the river.[5] The water was tested for nitrates, phosphates, and turbidity and for the presence of macro-vertebrates in the river.[6] The project sought cooperation with the Southern Africa Association of Youth Clubs who, in turn, identified a local youth club, called the Boys and Girls Education Foundation (Image 1). The motivation to work with a youth club was to firmly embed the project within a recognisable and accredited community structure. In this phase, we worked with a large group of children who became water literate—or, as a recent newspaper article coined, "budding young environmental scientists" (Chiguvare, 2023, para 1). This was an important objective, given the disconnect between communities and the river health around them, scarcity of water, the constantly looming threat of drought, and a lack of access to clean water in the area.

Even more so than in previous project phases, the water quality phase of DSF was purposively driven from the bottom up. The local communities played a significant role in selecting the citizen scientists, identifying the schools, and setting the agenda. This is significant because it gave space to the transformative potential of citizen science and its propensity for not only enhancing water literacy but also building trust, hope, dignity, and pride—intangible qualities that we have discussed in depth elsewhere (Goldin, 2003, 2015; Goldin et al., 2022, 2023).

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4   Department of Water and Sanitation, Water Research Commission, Southern African Association of Youth Clubs, Earthwatch Europe, UNDP, World Water Quality Alliance, Utrecht University.

5   Local citizen scientists were trained by an expert from Earthwatch Europe. The mini stream assessment scoring system (miniSASS) was obtained from an NGO, Groundtruth, in KwaZulu Natal (http://www.groundtruth.co.za/minisass).

6   We used Freshwater Quality Monitoring Kits donated by Earthwatch Europe for the chemical parameters and turbidity, and miniSASS, a uniquely South African scoring system, to identify macro-vertebrates. Together, these instruments enabled us to classify the water quality in the different sites of investigation.

Image 1
Budding young citizen scientists (picture courtesy of Ashraf Hendricks, 2023)

DSF was co-designed by academics, water professionals and a team of citizen scientists who were all involved in determining the activities from the onset. Thus, the project was deeply collaborative and driven by a notion of *slow science* and bottom-up learning by doing. The idea of slow science implies the need to take on a more practical and participatory form to support continuous learning and, as Stengers (2018) claimed, it means another science is possible where, by slowing science down, we create relationships with others that are not relationships of capture.

The story of Ruth

We now turn to the story of Ruth to discuss how deep-seated legacies of inequality influenced the politics of knowledge in our DSF project. To understand Ruth better, it is helpful to know a bit more about the geographical and social context of her life. Ruth (in 2023) was a 60-year-old woman who lives in Makhado Municipality, Limpopo, and is a local citizen in the Hout Catchment area. Ruth heard about the project through the Department of Agriculture in Makhado and enthusiastically agreed to participate as an unpaid volunteer in the project when it started in 2019. She became skilled in groundwater monitoring in remote rural wells, which was the core focus in Phase 1. Ruth collected data on water levels and learned to interpret them. As a local resident, Ruth played a key role in informing the objectives and design of later phases of the project.

Although Ruth is not single, she is the sole income earner, and personally suffers the high levels of chronic disease:

> I had colon cancer and I have been operated on twice. My husband has hypertension and had several strokes—his mother and father died of heart attacks, and my daughter

died of a stroke in 2021. My husband also has Parkinson's disease that runs in the family. Nothing I can do, just calm him down, and take him to hospital. Now that he is sick, it is taking so much of my time. My husband fell again this morning and it goes on and on. But the sun is shining in the morning—and we just say thank you God. (Ruth, personal communication, April 2023)

The five most reported crimes in the province are burglary in residential premises, assault with the intent to inflict grievous bodily harm, drug-related crime, common assault, and malicious damage to property (The Citizen, 2023). High levels of crime affect Ruth personally:

My son had an accident at 2010—they shot him—but thank goodness he is now fine. My other son stays here at the farm. He is 28 but he has problems. It seems he is on drugs—he is with the wrong company. I am trying to sort that out. (Ruth, personal communication, April 2023)

These difficult life circumstances in Limpopo are similarly stressed by another DSF team member, Ken (pseudonym) who demonstrates a keen understanding of the local conditions:

Our biggest challenge is water, drugs, and unemployment. Our youth doesn't go to school; actually, nothing is happening, they are ignorant. We have a lot of problems. I wouldn't say that people like schooling very much. They drop out a lot. They will look at others who are educated and yet unemployed. What is the point of going to school if I end up unemployed. . . . I am now at a school, and the parents don't even come to see us, they don't bother, they don't care, they just send the kids to school. (Ken, personal communication, September 2022)

And again:

[It is] challenging around youth: their unemployment and lack of skills. A lot drop out from the schools. For girls, teenage pregnancy is a big problem. The learners are not supported academically in their homes. When there is homework, the parents don't even care. The mother is away and the parents don't come to school to see the progress of the learner. My community is not getting support from their parents or the elders. . . . The other problem is they just focus on sports, they think if they do sports everything is fine, but it's not. (Ken, personal communication, November 2022)

In this hostile geographical and socio-economic setting of poverty and under-development, Ruth has survived by being agile and responsive to her everyday social and geographical landscape. Her ability to take action and adapt as a way of coping with poverty and dispossession puts her at the forefront as a persistent entrepreneur. She is a warrior who has made a success of her life despite the many obstacles around her, such as having to use poor roads which make it dangerous to travel, inaccessible food markets, the responsibility to raise children in environments of drugs and crime, and a husband who is disabled and whom she

has provided and cared for over three decades.[7] Ruth is a key member of the DSF team. She and the group of citizen scientists she works with play a pivotal role in determining the success—or lack thereof—of the project. The DFS citizen scientists all share experiences of poverty and dispossession and perhaps this has strengthened their ability to work together as a tight-knit team. As an unpaid volunteer, Ruth was part of the first three phases of DSF. As introduced earlier, Phase 4 required different skills that went beyond acquiring expertise to sample water quality. In addition to the technical mastery of the measuring instruments, the success of Phase 4 also largely depended on very specific local know-how about how to gain entry to the schools and build trust with the school principals. For the integrity of the project, and to support the activities of the science shop, it became imperative in this project phase to pay the DSF citizen scientists who had volunteered in earlier phases. This phase of the project had moved from more straightforward to more complicated tasks, in terms of cognitive involvement (Bruckermann et al., 2022).

Ruth earmarked a school to partner in the blitz. In building trust with the school principals, she gained access to classrooms for "water lessons." No easy task. Finding eligible schools was also not easy because they had to be (1) near enough a river or stream to make it possible to walk with learners to the water body and collect samples, and (2) rivers/streams are quite dry in winter and they had to have enough water to take samples (3) away from the existing Department of Water and Sanitation monitoring points because DSF monitoring aimed to fill a hydrological void and gather data in sites where the government was unable to reach.

Gaining entry into schools requires local knowledge and a very particular skill set. Ruth, and the others in the team, played a significant role not only in designing technical aspects of data collection but also developing a unique school programme with the transformative potential of citizen science at the fore. Their work included practical preparations needed to secure a successful blitz involving the young learners. As was the case with the other team members, Ruth had to use her remarkable political astuteness, social exactitude, and communication expertise to manoeuvre around school structures and systems. As a DSF citizen scientist team member, Ruth has inspired young learners to learn more about water and she feels proud and honoured to be part of the project:

> Well I am very grateful to be part of this project. I like water very much and I am very grateful that you have chosen me to work with you. And yes, I am doing my best. (Ruth, personal communication, April 2023)

The unintelligibility of Ruth's life circumstances for the university

Having established that Ruth played an essential role in the project as a citizen scientist, we now turn to the difficulties she encountered and explore how power, discriminatory practices, and unfair judgement impacted on her and endangered the quality of the project. We aim to demonstrate the unintelligibility of Ruth's life circumstances for the university that held "the

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7   At the time of writing, Ruth's husband had just died.

money bags" and made it virtually impossible to acknowledge her contribution by paying her when she could not be classified and approved under its guiding rules. Ruth's qualities were not recognised or seen to be eligible for financial reward for several reasons. Firstly, because she did not graduate from high school and thus has no school leaving certificate and hence no formal qualifications. Her terms of reference would therefore only provide for a very meagre salary, in fact, far less than a university student with limited life skills would earn.[8] The second reason given for not recognising her skills and refusing to draw up a contract was her age. Retirement age at universities is 65 years for female staff members and Ruth will soon reach that age. At almost 61, Ruth says:

> They think that because I am 60 my brain has expired. Which is exactly the opposite. My brain functions better now and I concentrate on stuff with more time on my hands. So, I have less things to concentrate on now which makes my brain actually function better. It should not count against you when getting older. It should be respected and not make you feel worthless because of your age. This is one of the reasons there was an obstacle with my contract, because of my age. But this brain is functioning more than 100 per cent. (Ruth, personal communication, April 2023)

As it turned out after much negotiation and tedious (for both the university administration staff and ourselves) back and forth correspondence, it became clear to the project leader that there are two ways for a university to facilitate payment; on the basis of a human resources contract, and through procurement. Having failed to secure an employment contract for Ruth, we were advised to try the procurement route. For this to work, Ruth needed to present an invoice with her company name, a tax clearance certificate, and proof of banking. Ruth complied. Cumbersome of course, for Ruth, unable to obtain this online, was obliged to travel 120 kilometres to the town of Polokwane at considerable cost to herself in terms of time and money, in order to get to the bank. But the invoice she submitted with the necessary documents was rejected on the grounds that it showed her company to have a "farming" function.

By then, Ruth had been working for four months into the project cycle. She put in many hours over those months without pay.[9] Ignorant of the aptitude and survival strategies of a citizen scientist (mother, wife, farmer, caterer), the system had apparently determined that a farmer cannot be part of DSF as a citizen scientist. Ruth responded:

> I took a great knock when I was not paid for my efforts and a lot of requirements were requested which were not stated in my contract. A lot was required in order to get paid for my service requested. And I am staying on a plot. The nearest big town is 120 kilometres from my place. I had to drive to town every day to meet your requirements in order to be paid only after five months. (Ruth, personal communication, May 2023)

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8   Here we relied on information from the DSF field manager who has a master's degree, is "young," and has not had the same problems as Ruth

9   The contract was signed in September 2022 but the funds were not in the account until October. The contract, once signed, took two months to go through the human resources system and once through, took another month before the first payment was reflected

And so our protagonist Ruth had little option but to collude or compromise. She was caught up in an array of conflicting emotions but kept her side of the deal and continued working so as not to jeopardise the blitz. At the same time, we continued to go through a long drawn out process to make it possible to remunerate Ruth as someone who does not fit the established image of who is and who is not included as a credible researcher within a university system.

Chowdhury (2022) aptly stated that in knowledge production, academic researchers often do not "see" their marginalised subjects with the same dignity and respect that is conferred on more powerful actors. As institutions of power, universities may value and enable local subjects as collectors of data but not as active partners in knowledge creation. Previous research (Goldin et al., 2022) also found that citizen scientists are usually seen as collectors—and not as collaborators who co-design, co-create, and co-own the empirical data excavated from their very own living circumstances. Even when collaboration features more prominently on the agenda, all too often the intensity, the methods, as well as the practical considerations of collaboration are determined top down by the university. This in spite of the reality that the knowhow to access and produce valuable knowledge and to nurture sustainable partnerships—all crucial for the success of the project—manifests far beyond the bricks and mortar of the university. Chowdhury (2022) and Muzanenhamo and Chowdhury (2023) noted that marginalised groups generally do not find opportunities to contradict and challenge their representation by researchers. For Chowdhury (2022), it was crucial to explore how misrepresentation occurs and what we can do about it. Muzanenhamo and Chowdhury (2023) saw this as deeply rooted in the structural privilege of the academy, which affects the way marginalised individuals outside the walls are listened to and interacted with.

Betwixt and between—being made invisible and inaudible

In addition to the skewed financial consequences that flow from the exclusion of those who are considered ineligible for reimbursement by the university, there can be much emotional damage. Scheff (1990), Seligman (1997, 2000) and Goldin (2003) all recognised the impact of emotions in situations that are characterised by exclusion, unevenness, and inequality. Feelings of overwhelming shame, for instance, can create chaos and what Seligman (2000) called an experience of "cosmic disruption" (2000, p. 83). What is at stake is a violation of meaning and one's sense of self. As Ruth said:

> We all have a human need to be appreciated for our effort. This will not stop me from doing my best [but] I just hope this hiccup does not happen again because it is really depressing and it is demotivating, and I feel really bad. I don't know what the matter is with me that the university doesn't like what I can give—maybe they think I can't give anything. (Ruth, personal communication, May 2023)

Holmes and McKenzie (2019) reminded us that when power relations manifest themselves within groups, they affect our feelings and we struggle to express what the "proper" emotion is that we are feeling. The anthropologist Victor Turner (1974, p. 232) constructed notions of liminality to describe ritual and meanings, and his notion of what he called liminality or being "betwixt and between" helps us to understand what happens in spaces and social interactions

that take place outside formal organisational structures. The betwixt and between experience, also referred to by Wicomb (1998) as an *ambiguous space,* is something that Ruth encountered, with all the chaos that goes with it.

When one aims to maximise the potential of citizen science to redress epistemic injustice, it is important to analyse and address the power dynamics between all involved. Departing from Fricker's (2007) notion of epistemic (in)justice, Kidd and Pohlhaus (2017, p. 1) quite elaborately pointed out that there is much to consider, given that

> epistemic injustice refers to those forms of unfair treatment that relate to issues of knowledge, understanding, and participation in communicative practices which include a wide range of topics concerning wrongful treatment and unjust structures in meaning-making and knowledge producing practice.

This treatment includes being left out and being silenced. It includes being made invisible and inaudible. It includes misrecognition or misrepresentation. It means all too often that one is assigned a diminished status and that one is unfairly distrusted: having to prove that one's knowledge exists, is legitimate, and recognised by those with influence—and power.

In the introduction of this paper, we referred to Jansen (2023), who addressed the importance of creating a new language for decolonising education. The disturbances we have referred to affect the personal and collective histories of people, which connect them to research by universities—their everyday lives become enmeshed with institutional hegemonies. If decolonisation means going deeper into the legitimacy of knowledge and who and how this is being defined, then this must include the process of co-creating that knowledge outside of the bastions of power. Clearly then, the supremacy of Western knowledge regimes are deeply rooted in the corridors of power that support and entrench these hegemonies. For this to persist, deep-seated systems of administration and human resources have been set up to control and maintain this status quo. Bureaucracies, for their survival, resist change. Yet, transformative experiences require transformative measures and being ethical to "othered peoples and places" (Sultana 2019, p. 36) renegotiating powers that resist this transformation. It calls for a responsiveness to representation, difference and diversity—so well described in the work of feminist thinkers such as Young (1990) and others (e.g. Bozalek et al., 2023; Fraser, 2009, Suransky & Alma, 2018; Zemblyas, 2015). "Decolonising the stereotypes and hegemonic discourses and practices in development requires confronting ongoing racializations, silencing, and discriminations across scales and locations" (Sultana, 2019, p. 34). It requires an ethical relook at power relations.

As is so clear in Bhawra's (2022) concept paper, decolonising research implies an active stance—it is an iterative process whereby each aspect of research and engagement needs to be unpacked to better understand the potential colonial underpinnings, and to reassess the processes through a decolonised lens. Unravelling the ubiquitous ways that colonisation sinks so deeply into every aspect of research (from knowledge production through to its dissemination and uptake), is to scrutinise each of these aspects, which includes the university structures themselves that perpetuate this injustice.

When addressing education in the era of the Anthropocene in which humans do significant damage to life on earth, Sutoris (2019) aptly characterised such behaviour as *slow violence*. Sutoris also discussed how environmental crises intersect with colonial and racist histories and unsustainable practices. In our citizen science project, DSF, we indeed encountered this slow violence. Over the past decades, there has been agreement by development practitioners that we need to reframe the tools of engagement when working with communities. Efforts to reframe such tools accelerated and became more refined in the 80s and 90s with the seminal work of Robert Chambers.[10] Recognising these changes in discourse and approaches to research, donors were also seeking a more ethical engagement with communities. Cook et al. (2017) argued that knowledge democratisation and social impact have become important dimensions in how research is funded and evaluated, so much so that in many instances, see for example the work of Dedding et al. (2020) and their examination of research in the Netherlands, funding will not be given for research unless communities are meaningfully involved.

A decolonial lens on research and the consequence of engagement with society means also grappling with the repercussions that powerful institutions have at community level. Despite changed discourses and approaches, our own work shows just how entangled communities are with these structures of power that reverberate so strongly despite these systems advocating—and often pleading—for the democratisation of knowledge. Persistent discriminatory rules and modus operandi within the corridors of power trouble efforts to engage with society in a more just way. Innovative participative methods and tools as described in earlier publications, such as Keep the Flow by Goldin et al. (2023) and Goldin et al. (2022), are efforts to decolonise, which are necessary but not sufficient to confront deep systemic injustices.

Unlearning Western-centric research practices

As Sutoris (2019, p. 199) put it:

> Humanity's predicament calls for an active and urgent response, and education has an important role to play, not in an instrumental way but through enabling and shaping action in concert with others [as] a key part of the solution to the slow violence of the Anthropocene age.

We believe that education has a critical role to play and in the global trend of heralding open science and science engagement (Knöchelmann, 2019), we think that citizen science as a form of engaged and slow science, can play an important role as a bridge that extends science out of offices, libraries, and laboratories and connects it in a meaningful way to communities. Currently, much emphasis is on science that flows from the university to the people. What all too often still remains unrecognised is how science flows from the public realm to the university—what Lisa Thompson (2002) decades ago called the science of the people. The remarkable skills and endurance of Ruth and the field team she is part of, shows how crucial

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10   Here we refer particularly to Chambers' (1997) evocative work on Whose Reality Counts? and many other
        development practitioners such as Cornwall and Jewkes (1995).

their work is in terms of gaining entry to schools, access to tribal authorities, and participation of counsellors, of the circuit manager representing the Department of Education, and so forth. Without the savvy of the citizen science team, we would not have known what the characteristics of particular water bodies are—when the rivers flow and when they do not. It would not have been possible to coordinate our efforts across quite diverse communities spread out across the district. It was this expertise on local social and environmental conditions that made it possible to gather data from places where data collection would otherwise be unmanageable. Such knowledge would be impossible to create by outsiders such as university researchers, on their own. Citizen scientists have expertise that is seldom accredited in research and, even less so, considered to be science. This is the place for slow science. Negotiations with schools, tribal authorities, and local stakeholders, development of water literacy inside and outside the classrooms, careful consideration of which members of the community participate and how—these are not quick fixes and require more realistic timeframes and resources.

How to create a more even distribution of power given the rigid systems that favour those who form part of the system? How to re-evaluate who is included as bearer of knowledge producing worthy research findings? The capabilities of the "ordinary" citizen, the citizen scientists are reluctantly—if at all—acknowledged. Again and again, we hear the refrain: "How good is the data gathered by citizen scientists? Can we rely on it?" The assumption is that data gathered by "non-scientists" is likely to be flawed and, for it to be considered authentic, it needs many more checks and balances than are normally applied to accredited scientists. And yet, we believe that citizen scientists, if well trained and versed with technical know-how, are no less likely than other scientists to gather good data—and, as citizen scientists.

Citizen science opens up new ways, and broadens our understanding of the decolonial gaze on knowledge creation. Bhawra (2022) asserted that decolonisation is a process that requires unlearning Western-centric research practices, from data collection and analysis to participant engagement and knowledge sharing. In order to decolonise research, we need to rethink not only how knowledges are produced, but also how multiple knowledge-bearers and -creators can be recognised. Ruth's story shows that a multiplicity of still-unrecognised skills are essential to address poverty and underdevelopment (such as poor roads, bad wi-fi, long distances) to engage with local indigenous settings in ways that fit these settings. The often linear and pre-defined rigid logic embedded in universities is difficult to challenge and, as we saw from our discussion, can evoke a negative chain reaction—perpetuating marginalisation and discriminatory practices.

In the South African context, we learn that decolonising universities is not just about decolonising universities that were advantaged as White universities during apartheid. The University of the Western Cape (UWC) where our own project is seated, stood out during the anti-apartheid struggle as the "bush" university whose mission it was, and still is, to nurture a critical understanding of the world and its major challenges, and help students discover how to serve others and make a positive contribution to society. Hidden away, quite literally in the

bush, UWC was—and still is—at the forefront of anti-racist politics. UWC was considered to be different from many other universities. Yet today, its norms of knowledge production and recognition seem to remain much the same as in other South African universities—as advantaged spaces that were formed by colonial discourses and practices. At UWC, knowledge production is recognised as a core research activity by and for academic staff and not by citizens. This deserves critical reflection that recognises the tensions between different realities—where citizen scientists struggle to comprehend the rules that govern universities, and universities struggle to recognise the needs, capabilities, and research agendas of citizen scientists. In order to decolonise research, we need to think again, about how other knowledges can be honoured.

Ruth did not bring shame or misrecognition onto herself. As Tisseron (1992) recognised, shame is brought about in a situation with others and it is not chosen but is inflicted—accompanied by a feeling of emptiness and the negative perception that others have of self. Power, presented as the "eye of the other," whether intentionally or not, triggers feelings of shame that emerge when a member feels excluded (Tisseron, 1992, p. 178). If we accept the image of slow violence referred to earlier, then we see how institutions protect their own authority, and the benefits that individuals are able to accrue, are directly connected to access—or in the case of Ruth, lack thereof—of its benefits. We also see how the idea of slow violence extends to knowledge production. The processes of producing knowledge are themselves part of the struggle for decoloniality as practices of co-creation. Ruth expected a relation of mutuality but instead, found that she was alone and her expectations were misinterpreted.

We know from the critical thinking of Ndlovu-Gatsheni (2022, 2023), Mamdani (2016), Mantz (2021), and Mbembe (2016, 2023), that decolonising knowledge generally involves processes within the walls of universities. However, other knowledge producing spaces also require critical re-examination when they are linked to universities as institutional spaces and their knowledge production processes. We see from our discussion above, that knowledge production is often ill matched with the concerns of those who are removed from universities. Decolonising knowledge means recognising just how porous the walls of universities are and how the patterns and practices of coloniality travel. We believe that citizen science can open new perspectives and possibilities, which could be part of the scope of initiatives and efforts to decolonise knowledge production. Through citizen science projects such as DSF, we can challenge the existing hierarchy. The story of Ruth shows that a knowledge production cycle that delegitimises and excludes her, leads to slow violence that obstructs her participation and thwarts her potential to co-create local knowledge. Rather than being considered as crucial, Ruth—and many other citizen scientists alongside her—are considered too much of a *fremdkörper* [a foreign object] in academia that needs to be modified. Such projection of a misfit is likely to foster feelings of shame, and other negative emotions—which can dehumanise citizen scientists rather than empower them.

In the course of our DSF project, we realised that the transformative potential of citizen science and the promotion of water literacy can be enhanced when we find ways to root

science in the agendas and needs of local communities. In our efforts to democratise science we have found worries and disturbances that are hard to endure. We agree with Del Savio et al. (as cited in Haklay et al., 2021), who pointed out that projects should be considered "not citizen science" if they do not democratise science. More specifically, those authors concluded:

> Importantly, scientists and entrepreneurs opting for crowd sourcing will not assess the success of their projects on the basis of the quality of citizen engagement that they are able to promote. Citizen science projects are often designed by actors motivated by very different hopes than to democratise science. Hence, we should be cautious when assessing the participatory rhetoric of citizen science promoters. (Haklay et al., 2021, p. 2)

Conclusion

At the start of our article, we referred to Jansen (2023) who posited that if decolonisation means anything at all, it has to be finding a whole new language for research partnerships. He referred to collaborations between universities in the global North and South. We agree with Jansen and asked ourselves: "How can citizen science be instrumental in decolonising research practices in ways that challenge historical and more traditional research projects?" We concluded that when we recognise the injustice and marginalisation of Ruth—and others like her—we are witnessing slow violence. Even as citizen science is lauded as bringing science to the people, we also plead for its concomitant reversal to bring people to science. Citizen science can open new perspectives and possibilities to add to the array and scope of initiatives towards decolonising knowledge production. It can punch holes in walls that were erected to protect certain knowledge regimes, thus challenging and breaking down existing knowledge hierarchies. The story of Ruth shows (1) her commitment, involvement, and value in the knowledge production cycle within the DSF project, and (2) the institutional exclusion and thus de-legitimisation of her potential and skills to generate knowledge and make possible otherwise impossible achievements of the project. It shows how Ruth was dehumanised.

For now, citizen science sits rather uncomfortably with the university system—particularly the authoritative and controlling systems of administration and management. And yet, we believe in the transformative potential of citizen science in decolonisation processes. It can disrupt rigid ways of seeing and doing, begging reimagination and renegotiation of research. Perhaps, as the global impulse for open science gains momentum heralding policy reforms and a fresher look at research and development, institutions and the systems of conducting research will be encouraged to rethink the way they engage with communities. We plead for a more fair distribution of power, and recognition of the contribution that citizens scientists bring to projects such ours. In so doing, we also recognise the value of slow science—and its role in reversing slow violence. Actively engaging with schools, learners, and communities can deepen the democratisation of knowledge production and draw on its transformative power.

For such new insights, universities in the global South can take a leading role. As Jansen (2023) so pointedly stated, citizens in Africa are not innocent in having erstwhile colonial masters believe that they control the terms of the development partnership. The same is true for university–community collaborations in citizen science projects. Citizen science projects can offer valuable opportunities not just to transform communities, but also to transform institutions of higher learning by confronting the colonial-rooted barriers that inhibit and restrict the co-creation of knowledge. In order to decolonise research, we need to rethink not only the ways in which knowledges are (re)produced but also how they can be recognised. We still know too little about the effects of the colonisation of state institutions and the disturbances, interferences, and disruptions to organising, sharing, and creating knowledge in public spheres outside of universities. Yet, we have experienced that these disturbances affect personal and collective histories of people when they partake in research that is linked to a university—their everyday lives become enmeshed with institutional hegemonies. Colonial legacies thus still deeply affect the politics of knowledge. If decolonisation means enhancing the legitimacy of knowledge and how and by whom legitimacy is defined, then experiences in citizen science practices offer interesting spaces to learn from.

Acknowledgement

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